AID RELIEF VALUES IN HAITI AFTER THE EARTHQUAKE: HAITIANS' PREFERENCES FOR FOOD AND OTHER BASIC COMMODITIES

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AID RELIEF VALUES IN HAITI AFTER THE EARTHQUAKE: HAITIANS' PREFERENCES FOR FOOD AND OTHER BASIC COMMODITIES

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TABLE OF CONTENTS

Chapter **Page**

LIST OF TABLES

Table **Page**

Table **Page**

LIST OF FIGURES

Figure **Page**

CHAPTER I

INTRODUCTION

"*Patronizing the poor is proving to be a deadbeat strategy. Trusting those in need may be the answer*" **- Christopher Werth, Newsweek**

The earthquake that hit Haiti in the beginning of 2010 resulted in $14 billion in damages to the Haitian economy according to one estimate; an amount which is more than two times Haiti's annual GDP (IDB, 2010). Over 220,000 people died and over 300,000 were injured. More than 105,000 homes were destroyed and another 208,000 were damaged. Over 1,300 schools and universities, and 50 hospitals and health services centers collapsed. The President's Palace, Parliament, the Justice Palace and most of the Ministry and public administration buildings were destroyed in the earthquake (PDNA, 2010).

The disaster led to tremendous international solidarity to help Haiti recover from the tragedy. Governments and international organizations pledged money, and fundraisers took place around the world to collect money and other commodities such as water, food, and clothes for Haiti. Four days after the earthquake, a flash appeal for aid was issued by the office of the United Nations Development Program (UNDP) in Haiti, which indicated the primary areas of intervention identified by 31 international organizations working in the country. The priorities included: medical services and supplies, clean water and sanitation, emergency shelter, food, family reunion, rubble

removal and street cleaning (UNDP, 2010). International aid came mostly under these particular forms after the earthquake. Numerous flights landed in Haiti in the days following the quake. Humanitarian missions continued for several months after the earthquake.

But, what is the impact of the aid relief received? Does the relief meet the priorities as judged by earthquake survivors themselves? After the earthquake, international donors pledged $9.9 billion to support the rebuilding process in Haiti (United Nations, 2010). Knowing the best way to allocate this money can lead to more fruitful results. Effective aid relief should match the priorities of the people in need, and therefore it is important for the Haitian government, international organizations, and Haitian NGOs to be aware of what kind of aid people need and to judge the effectiveness of aid efforts.

This research has two primary objectives: a) determine Haitian's preferences for food and other basic needs in the aftermath of the Haiti's earthquake; b) determine the quality of life Haitians desire. We then analyze how people value food donations compared to some other basic needs such as housing, medical care, employment, and money. Other specific objectives include determining: i) the type and quantity of food aid received, ii) the impact of food aid on households' food expenditures, iii) the impact of education and income level on preferences for food aid, iv) the impact of geographic location on preferences for aid relief, v) the relationship between time preferences and preferences for different types of aid relief. A final objective was to explore the usefulness of a survey-based approach to measure the economic consequences of natural disasters that result from changes in citizens' living conditions.

CHAPTER II

BACKGROUND

How do people value the various prominent sources of utility in a situation of emergency following a natural disaster? There is not a great deal of research regarding people's needs following a natural disaster. In a study related to the allocation of Natural Disaster Relief Funds in Honduras, following Hurricane Mitch in 1998, Morris and Wodon (2003) argued that, because the aid relief in Honduras was diversified among food, clothing and medicine, it was difficult to target those in need. A key challenge was to determine how to provide more relief to those who had greater losses or who became poorer because of the disaster. Morris and Wodon (2003) based on the argument that the needs for these goods are relatively similar between households and pointed out that absorption capacity of households is limited. Therefore, they suggested that allocation of relief funds be made according to the pre-disaster assets levels and the asset losses by households. One solution they suggested was to allocate relief funds according to the pre-disaster assets levels and the asset losses by households. Their recommendations were based on the assumption that needs are relatively similar between households of a given level of income and that absorption capacity of households is limited.

Targeting relief is a good way to achieve efficiency. But appropriate information on beneficiaries is necessary to do so. Reliable data can also give useful information about people's needs because it is not obvious needs will be the same across

beneficiaries, contrary to Morris and Wodon's point of view. Furthermore, aid relief available is more likely to be limited in most cases. Therefore, there are few situations where households might reach their full absorptive capacity.

Chappell *et al*. (2007) examined the effectiveness of government disaster aid following hurricane Katrina. They explained that political factors, rather than need, would explain nearly half of all disaster relief administered. They argued that natural disasters can be a shock to local economies and may negatively impact local labor markets by interrupting business activity. Chappel *et al.* (2007) however stated that natural disasters can also provide a positive shock with the subsequent recovery efforts. In their research, they underline the importance of housing in restoring post-disaster basic economic activity. Our research goes beyond Chappel *et al* in focusing not only on the effectiveness of government aid but by also including aid relief from international organizations and local NGOs. Chappel *et al.*'s choice to focus on government is relevant to the reality in the US where the government is well structured and leads to high expectations of effective aid delivery. However, for the particular case of Haiti, the government post disaster's response has been unsurprisingly very limited, compared to non-profit organizations due to lack of structures, especially after the earthquake.

Cash Aid and Food Aid

After a natural disaster, cash as a primary type of aid can be sometimes efficient in allowing people to allocate it in a way that maximizes their utility. On the other hand, it can also be less efficient when market chains are broken where people do not have access to sellers to purchase what they need. The controversy between cash aid versus food aid or other types of aid go beyond situations of emergency. Gelan (2006) examined the

relative effectiveness of cash versus in-kind food aid using the case of Ethiopia. He argued that cash aid has larger positive effects on household welfare, with multiplier effects on households other than direct recipients. He also pointed out that food aid provides a disincentive to local food production. However, he argues that when cash transfers drive prices up those who are neither targeted nor beneficiaries might suffer with welfare losses.

Del Ninno *et al* (2006) made similar arguments. In a study conducted on food aid in four major recipients countries (India, Bangladesh, Ethiopia and Zambia), Del Ninno *et al* (2006) suggested that food aid that supports building of production and market enhancing infrastructure, which is timed to avoid adverse price effects on producers, and which is targeted to food insecure households, can play a positive role in enhancing food security. He argues however that, in many cases, markets can be more effective than food aid and that cash transfers may be a viable alternative to food transfers in-kind.

Coate (1987) expressed a mitigated view. He pointed out that the relative effectiveness of cash and direct food relief will depend on some conditions as in the following: What is behavior of traders? Will food be exported, imported or neither exported nor imported? He argued that each of those specific situations have specific consequences. He supported the idea that in those cases where food is exported from the famine region, cash relief will be optimal if traders behave competitively. If there is monopoly, cash relief will no longer be optimal. In situations of importation in region affected by famine, Coate argued that cash or direct food relief will be equally effective if the traders are competitive.

Cash aid is one type of aid that has been used by international donors after the earthquake in Haiti. In general, it is also an alternative to other types of aid since each type and quantity of aid has a monetary value. In this sense, it is relevant to see how Haitians react to cash aid compared to other types of aid.

Food Aid and Food Expenditures

The impact of food aid programs on recipients' food expenditures has been a major interest among researchers. Focusing on the food stamp program in the US, Senauer and Young (1986) argued that, among recipients, food stamps have a greater impact on at-home food expenditures than an equal amount of cash income. They rejected therefore the traditional model that the impact of food stamps on food spending will be the same as for an equal cash transfer, for food stamp recipients whose normal food purchases exceed their coupon. Senauer and Young (1986) suggested several hypotheses to explain their finding.One explanation refers to a sense of gratitude from recipients who might feel the need to use their coupon to expand consumption in order to adjust to society's expectations. Another reason is the dynamics of the household budgetary process that might be influenced by the food stamp program. Household would tend to make larger and/or more expensive food purchases early in the month.

Smallwood and Blaylock (1985) found a similar result. They found that bonus stamp income has more than twice the impact of money income on food expenditures. Food expenditure differentials associated with the food stamp program participation were found to be larger when there were elderly persons or infants present in the households. How does an overall food aid program after a natural disaster affect households' expenditures? It is of interest to explore this relationship between food aid and

expenditures in the case of Haiti to better understand if food aid has contributed in some ways to a reduction of households' expenses on food.

In the following we present the data collection process and describe the survey used to implement the experiment. We present the conceptual framework used to determine the relative importance Haitians place on different types of aid relief and we also present the conceptual framework utilized to determine the quality of life Haitians most prefer. We describe the choice experiment used in both cases.

CHAPTER III

DATA AND METHODS

To elicit people's preferences for food and other basic needs in Haiti after the earthquake, this research relied on data collected from in-person surveys with over 1,000 Haitians in July and August 2010, approximately six months after the earthquake. Each respondent was allocated to one of two survey versions. In the first version, we asked respondents to answer a series of best-worst questions in which they indicated which types of aid they most and least preferred. In the second version, we asked people to indicate which type of life they most preferred, where the hypothetical lives differed by amount and type of food, income, medical care, education and housing available. All respondents answered questions regarding impacts of the earthquake on their lives and also answered a number of other questions regarding socio-economic characteristics and food consumption behaviors. In what follows, we present the data collection process and we discuss the survey sections.

3.1. Data Collection

Interviews were conducted in three different locations: Léogâne, Port-au-Prince and Jacmel. Léogâne was chosen as representative of rural areas. Moreover, Léogâne was the epicenter of the earthquake, and represents a location where 80% of the houses were destroyed (PDNA, 2010). Port-au-Prince was chosen to represent an urban area. It is the

capital and the most populous city in Haiti. The largest number of deaths and houses destroyed in the earthquake occurred in Port-au-Prince. Jacmel was selected as a third location representative of a small city affected in the earthquake.

Participants were recruited in tent cities, private residences, universities, hospitals and markets to diversify the characteristics of the respondents. Because everyone was affected someway by the earthquake in Port-au-Prince, Léogâne and in a big part of Jacmel, every Haitian who was living in these cities at the time of the survey could have been in the target population. So as not to double-count individuals from the same household, only one person of a specific gender was interviewed in a private residence or a tent. This rule was not applied for hospitals, universities and markets where there was less chance that respondents could have come from the same household. Particularly in Port-au-Prince, the survey was conducted in five tent cities: Champ-de-Mars, Pétion-Ville Club, Place Jérémie, Place Ste Anne and Saïeh. In Léogâne, some people were interviewed at Hôpital Ste Croix (Ste Croix Hospital) and Place Anacaona. In Jacmel, most of the respondents were recruited from Parc Pinchinat, the main tent city in this city.

No monetary reward was offered to participants. We explained the purpose of the survey and presented in a detailed manner the content of the informed consent sheet. If they felt comfortable with that, then they were invited to answer the questions of the survey. Some people refused categorically to answer questions, pointing out that several interviewers came before to ask them questions after the earthquake but they never received any aid or help afterwards. Some other people were more cooperative and agreed to participate based on the idea that the results of this study could be of interest for the country.

To take into account the higher population in Port-au-Prince, 75% of questionnaires were assigned to this location, 15% were used for Léogâne and 10% for Jacmel[1].

A sub-set of 385 people from all three locations were surveyed regarding the desirability of different types of aid relief. Another group of more than 700 people were assigned questions regarding their life choices.

The original questionnaire was written in English. The survey was translated to a version in Creole, the mother tongue in Haiti, to ensure a better communication between interviewer and respondent and for a better accuracy of the responses.

The survey began with questions about how people were affected by the earthquake, followed by questions on types and quantity of aid received. Then, respondents were asked some questions about their situation in terms of housing, medical care and location before *and* after the earthquake. Afterwards, they were presented the choice questions (either the best-worst or life choice questions depending on the treatment to which they were assigned), followed by some specific questions about characteristics of the respondents.

On average, 8.25% of the participants from the whole sample did not go to school at all, 20.95% attended only primary school[2], 50.60% had been to secondary school[3], and 20.20% had attended a University at least for one year. The last Census in Haiti (IHSI, 2003) revealed that among the population of 5 years old and older, 37.4% did not go to school at all, 35.2% have attended primary school, 21.5% have been to secondary school

[1] According to projection from the 2003 Census (IHSI, 2009), Port-au-Prince had 2,296,386 inhabitants in 2009, Léogâne had 181,709 people and Jacmel had 36,693 people.
[2] Primary school is the education level range from 1st grade to 6th grade.
[3] Secondary school is the education level going from 7th grade to Philosophy class, the last class in High School in Haiti.

and 1.1% has a university level. Based on this comparison, it would seem that our sample was better educated than the general population, but several explanations for the discrepancy exist. For the survey, we only included people of 18 years or older while the education data reported by Haitian Institute for Statistics (IHSI) counts all individuals aged five and older. The last census took place in 2003. Some changes may have occurred in the population over the past eight years. In addition, the figures for the census refer to the whole country where 53% of the people live in rural areas (IHSI, 2009). Because Port-au-Prince was the main area affected in the earthquake, we collected the majority of observations from this city. That is, we chose to survey those people who were primarily affected by the earthquake. As a result, our survey was more heavily urban than is the country as a whole.

Table 1. Approximately monthly income

Monthly income*	**Percentage of people**
Less than 5000 gourdes (Less than 125 $US)	74.11%
Between 5000 and 20000 gourdes (Between 125 $US and 500 $US)	21.96%
Between 20001 gourdes and 50000 gourdes (Between 500.025 $US and 1250 $US)	3.27%
Between 50001 gourdes and 100000 gourdes (Between 1250.025 $US and 2500 $US)	0.56%
More than 100000 gourdes (More than 2500 $US)	0.09%

Number of observations: 1070
Exchange rate: 40 gourdes= $ 1 US

The official average income level in Haiti is 5,462 G (IHSI, 2003). When the different ranges presented in the survey are considered at their average levels, the average income for the respondents is about 6,649 G. This figure is higher than the one presented by IHSI, the official Statistic institute. But once again, recall the census data is over eight

years old and inflation over the intervening years could well explain the higher average income levels we measure.

The average age for the people surveyed is 34 years old, and 49.3% of the respondents are males. This distribution is close to the one presented in the 2003 census where men accounted for 48.2% of the population.

As shown in table 1, three quarters of the Haitians who responded to the survey have a monthly income less than 5,000 G ($ 125). Only 20% people have a monthly income between 5,000 G ($ 125) and 20,000 G ($ 500). In some few cases (3.92%), the income has been more than 20,000 G ($ 500).

Table 2. Location where the people interviewed were living before the earthquake and 6 months after

Location	Percentage before	Percentage after
Port-au-Prince	75.21%	74.65%
Léogane	15.45%	15.54%
Jacmel	8.05%	8.14%
Other	1.30%	1.67%
Total	100%	100%

Number of observations: 1081

We were interested in determining whether there had been significant migration six months after the earthquake. The results indicate that the vast majority of respondents were still living in the same city where they used to live prior to the earthquake. As presented in table 2, 75% of the respondents were living in Port-au-Prince six months after the earthquake. Around 15% were living in Léogâne where the epicenter of the earthquake was, while 8.14 % of the respondents were living in Jacmel. Almost 75% of the respondents used to live in Port-au-Prince, 15.45 % in Léogâne and 8.05 % in Jacmel before the earthquake.

3.2. The best-worst scaling method

The best-worst scaling method is rapidly becoming a popular method to study preferences because it forces people to make tradeoffs between scaled items and preferences can be placed on an underlying ratio scale of measurement. According to this method, consumers are presented a set of items and are requested to indicate which one is best and which one is worst (Lusk and Briggeman, 2009). Auger et al. (forthcoming) used the method in research that examined consumers' preferences with respect to social and ethical features of products across six countries. Lusk and Briggeman (2009) used the best-worst scaling method to analyze the relative importance consumers place on food values. Flynn et al. (2006) utilized the best-worst scaling method to investigate choices regarding health care. The best-worst scaling method presents several advantages. It provides more information than other measurement methods such as ranking or rating (Flynn et al., 2006). It is convenient for use of cross-national research comparisons (Cardello et al., 2010).

The best-worst scaling method supposes respondents choose the two items out of a set of K items that maximize the difference on a particular scale of importance (Lusk and Briggeman, 2009). If there are K items in a choice set, then there are $K(K\text{-}1)$ best-worst combinations possible. By choosing one pair out of all $K(K\text{-}1)$ possible pairs, respondents are assumed to indicate the maximum difference.

Following Lusk and Briggeman (2009), we assume that α_k represents the location of value of item k on the specific scale of preference. The unobserved level of importance

for individual *i* is: $I_{ik} = \alpha_{k} + \varepsilon_{ik}$, where ε_{ik} is an error term introduced to take into account individual idiosyncrasies unobservable to the analyst.

The probability that items *k* and *j* are chosen out of the set as best and worst is equal to the probability that the difference between I_{ik} and I_{ij} is greater than all other *K(K-1)-1* options in the choice set. Assuming the error term is distributed *iid* type I extreme value, a multinomial logit model can be used to determine the probability, as following:

(1) Prob (*k* is chosen most preferred and *j* least preferred)

$$= \frac{e^{\lambda_k - \lambda_j}}{\sum_{l=1}^{K} \sum_{m=1}^{K} e^{(\lambda_l - \lambda_m) - K}},$$

The parameters in (1) can be estimated using maximum likelihood methods. The estimated parameters indicate where each issue falls on the underlying scale of preference. In addition to the multinomial logit model, a count-based method is also used to calculate the relative importance of different types of aid relief. Using this approach, the relative importance (or preference) of different types of aid is determined by taking the difference between the number of times an attribute was chosen as most preferred and the number of times it was chosen as least preferred across a series of choice tasks. The multinomial logit method should yield similar results; the advantage of the former is that the coefficients can be used to place each issue on a ratio-scale. According to the design used, the highest possible value for an option is +6 and the lowest possible value is -6. Depending on the number of time an issue is chosen as most preferred and least preferred, its value will be somewhere in the interval [-6; +6] .

This research considered five attributes for the best-worst choice experiment: housing, food, medical care, job and money. Each attribute was varied at two levels,

except for housing which had three levels. Eleven aid options in total were considered. Our task was then to assign each of those options to different choice sets in the survey. A full factorial design was created in which each of the 11 aid options was either present/absent as a best/worst option. From this full factorial of 2^{11} choice options, we selected an orthogonal, main effects fraction in which the presence/absence of each option was independent of the presence/absence of the other options.

Which of the following options of aid would you most and least prefer? (*Check only one option as the most important and one as the least important*)

Most Preferred		**Least Preferred**
☐	**Food aid** (You receive a monthly allocation of 2 bags of rice (25 kg), 2 gallons of oil (3.78 liters), 2 bags of bean (5.56 kg); 2 packs of milk (5.56 kg))	☐
☐	**No food aid** (You will not receive any food aid)	☐
☐	**Medical aid** (You can go to the doctor once a month and have the bills paid by the government or other agencies)	☐
☐	**Job aid** (You find a job that meets your salary expectations)	☐
☐	**No job aid** (You will not receive any job aid)	☐
☐	**Money aid** (You receive a monthly aid in cash of 5,000 G)	☐

Figure 1. Example of best-worst question

The resulting design consisted of 12 best-worst questions, which were presented to each respondent. Out of the 12 best-worst questions, five questions contained four options of aid, six contained six options and there was an additional question with ten options of aid. For each question, respondents were asked to choose which option of aid

they most preferred and which one they least preferred. An example of one of the best-worst questions is presented in figure 1.

Data from this portion of the survey can be used to test several hypotheses. First, we expected to find that "house rebuilding" will be the most preferred type of aid relief. It takes time to rebuild houses destroyed in the earthquake, and therefore we expect people would be very interested to receive help for this task. In addition, building a house is a very demanding and expensive task and therefore would drive preferences for housing aid.

Second, we hypothesize "house rebuilding" will be relatively more preferred in Port-au-Prince than in the other areas. Houses in concrete are more common in Port-au-Prince than in rural areas (IHSI, 2009). People in rural areas can settle more easily into new places to live due to availability of free land and also because of the ability to construct new houses from wood.

Third, we hypothesize that people with higher income will have lower relative preference for food aid compared to people with lower income. Higher income individuals can more easily afford to buy food, while access to housing, medical care and job can be more difficult to attain.

Fourth, we hypothesize that people with higher education levels will prefer other types of aid over food aid. This hypothesis is based on the rationale that higher educated individuals are more likely to be aware of negative consequences of food aid on domestic agriculture.

Fifth, we hypothesize that people who have received food aid spent less on food after the earthquake. Food aid recipients are assumed to reallocate part of the money they used to spend on food to alternative uses.

The utility function generated from the different options of aid for individual i can be presented as following:

(2) $V_i = \mu_1(\text{jobaid})_i + \mu_2(\text{houserebuilding})_i + \mu_3(\text{Moneyaid})_i + \mu_4(\text{medicalaid})_i + \mu_5(\text{foodaid})_i + \mu_6(\text{Nofoodaid})_i + \mu_7(\text{liveinatentcity})_i + \mu_8(\text{Nomoneyaid})_i + \mu_9(\text{Nomedicalaid})_i + \mu_{10}(\text{Nohousingaid})_i + \mu_{11}(\text{Nojobaid})_i$

Beside the utilization of the count-based method to rank preferences, the Multinomial logit method is used to estimate the model. Then, preference shares are calculated based on the following:

(3) $$\text{Prob}\{\text{option j is chosen}\} = \frac{e^{\mu_j}}{\sum_{k=1}^{11} e^{\mu_k}}$$, where μ_j is estimated coefficient for option j out of the 11 options.

3.3. Choice-based conjoint method

Another group of respondents were asked to indicate which life they would prefer. To determine the quality of life Haitians prefer, we used choice-based conjoint analysis – also known as a choice experiment. With this method, each attribute or variable is represented at different levels which systematically vary to create a set of choice questions. Most choice experiments vary the characteristics of market products; for

example, the price of apples or the brand of dishwashing detergent. In a point of departure, we describe different types of lives that vary systematically with factors such as type of housing and monthly household income and ask respondent which life they would prefer. The usefulness of our approach is that it can be used to determine the extent to which, for example, housing aid would benefit people; the approach is also useful for determining the extent of the losses experienced by the earthquake (e.g., what is the value of a lost house?).

Table 3. Life attributes with their different levels

Housing:
- Housing1: Tent
- Housing2: House in concrete with 1 level
- Housing3: House in concrete with ***more*** than 1 level
- Housing4: House covered with metal or plastic sheet with 1 level
Food:
- Food1: Rice, beans, maize, banana only available: 1 meal a day
- Food2: Rice, beans, maize, banana only available: 3 meals a day
- Food3: Rice, beans, maize, banana, milk, fruits, meat, vegetables: 1 meal a day
- Food4: Rice, beans, maize, banana, milk, fruits, meat, vegetables: 3 meal a day
Medical care:
- Medicalcare1: Free medical care provided by government/NGO
- Medicalcare2: Medical care with 25 % of the bills paid by the government/NGO/Insurance company
- Medicalcare3: Medical care with 75 % of the bills paid by the government/NGO/Insurance company
- Medicalcare4: Medical care self funded
Income:
- Income1: Less than 5,000 gourdes
- Income2: Between 5,000 and 20,000 gourdes
- Income3: Between 20,001 gourdes and 50,000 gourdes
- Income4: Between 50,001 gourdes and 100,000 gourdes
Education for your children
- Education1: No school at all
- Education2: Primary school
- Education3: Secondary school
- Education4: University degree

In the survey, respondents made repeated choices between two different lives that differed according to the five attributes presented in table 3: housing, food, medical care, monthly income and education level guaranteed for children. Each attribute was varied at four levels. For Housing, respondents had to choose between tent, house in concrete with 1 level, house in concrete with more than 1 level and house with plastic or metal cover. The last three types of housing represent typical architectures of private residences in

Haiti. After the earthquake, tents became another form of housing and were then included in the choices to complete the options.

Which life option would you prefer?

	Option A	**Option B**
Housing	Tent	House in concrete with 1 level
Food	Rice, beans, maize, wheat, bread only available: 3 meals a day	Rice, beans, maize, wheat, bread only available: 1 meal a day
Medical care	75 % of the bills paid by the government/NGO/Insurance company	Completely free and provided by Government or other agencies
Monthly Income	35,000 gourdes	12,500 gourdes
Education for your children	University degree	Secondary school
I would choose	[ ]	[ ]

Figure 2. Example of choice question about quality of life

For each question, respondents had to choose between "option A" and "option B." Therefore, there were 4^5 =1,024 life options that could be defined. As a result, the full factorial design with two options consisted of 4^5*4^5 = 1,024*1,024 =1,048,576 possible choices. From this full factorial design, we created a main-effect, orthogonal design with a D-efficiency score of 100. The resulting design consisted of 36 choice questions. To make the task easier for respondents to answer the questions, we created four blocks or survey versions each containing nine questions. Each respondent received one block of nine questions to answer. An example of one of the choice questions is presented in figure 2.

We analyzed the responses to the choice questions using the random utility framework proposed by McFadden (1974). In this approach, the utility function is divided into two parts: a systematic portion, which is assumed to depend on the attributes and a stochastic error term, introduced to take into account the fact that people's

preferences cannot be perfectly observed. Individuals are assumed to choose the choice option that provides them the highest utility.

The random utility function may be defined as following:

$U_{ij} = V_{ij} + \varepsilon_{ij}$, where U_{ij} represents utility individual *i* derives from option *j*, and where V_{ij} represents the deterministic part and ε_{ij} the stochastic component (Train, 2009).

Individuals are assumed choose option *j* over option *k* if their utility for *j* exceeds *k*. Therefore, the probability of choosing option *j* over *k* is the probability that:

$$(4) \quad P[U_{ij} > U_{ik}] = P[V_{ij} + \varepsilon_{ij} > V_{ik} + \varepsilon_{ik}]$$

If the ε_{ij} are distributed iid type I extreme value, then the probability of option *j* being chosen is given by:

$$(5) \quad \text{Prob\{option j is chosen\}} = \frac{e^{XjB}}{\sum_{j=1}^{J} e^{XjB}},$$

where *j* is the option of life chosen. The utility function is assumed to be function of type of housing, food, medical care, income and education level.

We estimated the model using income as a continuous variable. The utility function is presented as following:

$$(6) \quad V_i = \alpha_1(\text{Income})_i + \lambda_{21}(\text{Housing})_{1i} + \lambda_{22}(\text{Housing})_{2i} + \lambda_{23}(\text{Housing})_{3i} + \lambda_{24}(\text{Housing})_{4i} + \lambda_{31}(\text{Food})_{1i} + \lambda_{32}(\text{Food})_{2i} + \lambda_{33}(\text{Food})_{3i} + \lambda_{34}(\text{Food})_{4i} + \lambda_{41}(\text{MedicalCare})_{1i} + \lambda_{42}(\text{MedicalCare})_{2i} + \lambda_{43}(\text{MedicalCare})_{3i} + \lambda_{44}(\text{MedicalCare})_{4i} + \lambda_{51}(\text{Education})_{1i} + \lambda_{52}(\text{Education})_{2i} + \lambda_{53}(\text{Education})_{3i} + \lambda_{54}(\text{Education})_{4i},$$

where the index i represents individual i and λ_{kj} the coefficient for each variable.

We sought to determine relative importance of quality of life attributes using the results of the multinomial logit model estimated. Orme (2010) showed how to determine relative importance score. He considered the impact each attribute can make in the utility function by taking the difference between the level with the highest utility and the one with the lowest utility. Then, all those differences are summed up to come up with a total utility range. Attribute importance is then determined as the ratio between the difference in utility for one attribute and the total utility range, as presented below:

Attribute importance (AI) = (Attribute utility range (AUR))/ (Utility Range Total (URT))

For instance, attribute importance for housing will be presenting as following:

(7) $AI_1 = AUR_1/(URT)$ or AI_1

$= AUR_1/ (AUR1+AUR_2+AUR_3+AUR_4+AUR_5)$

$= \lambda_{4j}/ (\lambda_{1j} + \lambda_{2j} + \lambda_{3j} + \lambda_{4j} + \lambda_{5j})$

Where:

$AUR_1 = \lambda_{1j}$ = attribute utility range for income;

$AUR_2 = \lambda_{2j}$ = attribute utility range for food;

$AUR_3 = \lambda_{3j}$ = attribute utility range for medical care;

$AUR_4 = \lambda_{4j =}$ attribute utility range for housing;

$AUR_5 = \lambda_{5j}$ = attribute utility range for education.

When it comes to quality of life, we hypothesize that Haitians value education more than other life attributes. Education is considered in Haitian families as a gate to get out of poverty. Most of the time, they sacrifice comforts in their life to make sure their children can go school.

We used the parameters estimated from the model where income is considered as continuous variable to calculate willingness to pay (WTP). Considering the k^{th} attribute, WTP for option *j* vs. option *k* is the income level one would give up to have *j* instead of *k*. Based on the previous statement and following equation (6), WTP for house in concrete with one level relative to tent is $WTP_{House2\text{-}House1} = -(\lambda_{22} - \lambda_{21})/\alpha_1$. In the same idea, WTP for University degree relative to Secondary Education is $WTP_{Univ\text{-}Sec} = -(\lambda_{54} - \lambda_{53})/\alpha_1$. In general, λ_{ij} is the coefficient estimated for the levels of each attribute and α_1 is the estimated coefficient for income.

We sought to measure changes in people's quality of life as a result of the earthquake. Major changes occurred particularly in people's housing situation where most of them are living differently from the way they used to live before. We asked them questions about types of housing they used to live in before the earthquake and types of housing they are living in after the earthquake. We calculated change in utility resulting from change in housing situation for each respondent.

Based on equation (6), total change in housing situation, everything else equal, is given by:

$$(8) \quad \sum(1/\alpha_1)\,[(\lambda_{21}(Housing_{1j})^{After} + \lambda_{22}(Housing_{2j})^{After} + \lambda_{23}(Housing_{3j})^{After} + \lambda_{24}(Housing_{4j})^{After} - (\lambda_{21}(Housing_{1j})^{Before} - \lambda_{22}(Housing_{2j})^{Before} - \lambda_{23}(Housing_{3j})^{Before} - \lambda_{24}(Housing_{4j})^{Before}]$$

Following equation (8) average change becomes then:

$$(9) \quad (1/N)\sum(1/\alpha_1)\,[(\lambda_{21}(Housing_{1j})^{After} + \lambda_{22}(Housing_{2j})^{After} + \lambda_{23}(Housing_{3j})^{After} + \lambda_{24}(Housing_{4j})^{After} - (\lambda_{21}(Housing_{1j})^{Before} - \lambda_{22}(Housing_{2j})^{Before} - \lambda_{23}(Housing_{3j})^{Before} - \lambda_{24}(Housing_{4j})^{Before}];$$

$(Housing_{ij})^{Before}$ and $(Housing_{ij})^{After}$ are dummy variables, taking the values of 1 or 0.

For instance, for a person who used to live in a house with metal or plastic cover and who moved to a tent, everything else equal, utility is presented as following:

$$(10) \quad V_i^{After} - V_i^{Before} = \lambda_{24}(Housing_{4j})^{After} - \lambda_{21}(Housing_{1j})^{Before}$$

$$= \lambda_{24} - \lambda_{21;}$$

$$(Housing_{4j})^{After} = (Housing_{1j})^{Before} = 1.$$

3.4. Theoretical approach for time preference

If you were to choose between A and B, which option would you prefer?

Option A	**Option B**	**Choose A or B**	
HTG 5000 today	HTG 5250 in a year	( ) A	( ) B
HTG 5000 today	HTG 5500 in a year	( ) A	( ) B
HTG 5000 today	HTG 6000 in a year	( ) A	( ) B
HTG 5000 today	HTG 6500 in a year	( ) A	( ) B
HTG 5000 today	HTG 7000 in a year	( ) A	( ) B
HTG 5000 today	HTG 7500 in a year	( ) A	( ) B
HTG 5000 today	HTG 8000 in a year	( ) A	( ) B
HTG 5000 today	HTG 8500 in a year	( ) A	( ) B
HTG 5000 today	HTG 9000 in a year	( ) A	( ) B
HTG 5000 today	HTG 9500 in a year	( ) A	( ) B

Figure 3. Question regarding time preference

We elicited participants' time preferences using the approach suggested by Harrison et al. (2002). Respondents were asked to make a series of choices between two options. As presented in figure 3, in option A, they could have 5000 Gourdes (G) now and in option B, they would have some higher amounts in one year. While the amount in option A stays the same, the amount in B varies progressively. The discount rate for an individual is the

percentage increase between option A and option B when an individual moves his choice from A to B. A high discount rate corresponds to low patience while a low discount rate means a higher willingness to wait. We hypothesize that the less patient a respondent is, the more he/she will value food, money and job relative to housing. It takes time to build a house. Receiving food, money, or getting a job provides immediate benefits and are thus likely to be more valued by those who are relatively less patient.

CHAPTER IV

RESULTS

4.1. Summary Statistics

This section presents the results for the general questions included in all survey versions. The following results combine responses from all respondents from the whole sample of 1,092 people.

4.1.1. Effects of the earthquake

Table 4. How people were affected by the earthquake

Way affected	Percentage [a]
Friends killed	66.91%
House destroyed	55.86%
Family members injured	50.27%
Family members killed	48.80%
House damaged	34.89%
Other way (disease, loss of business or other properties, stress, psychological problem)	20.05%
Workplace damaged/destroyed	16.20%
Personally injured	12.64%

Number of observations: 1092

[a] Note: Percentage do not sum up to 100 because people may have been affected more than one way

More than half of the Haitians surveyed had their houses destroyed in the earthquake in Port-au-Prince, Léogane and Jacmel, as indicated in table 4. The proportion of houses damaged is also high (34.89%). Almost half of the people had at least one of their family

members killed in the earthquake. Two thirds of the Haitians lost at a friend in the earthquake. Half of the respondents had at least one family member injured in the earthquake.

4.1.2. Types of aid received

Almost all respondents (98%) were expecting to receive some kind of aid relief after the earthquake. However, only 44% actually received aid at the time of the survey, six months following the earthquake. Table 5 shows the types of aid received among the 64% who had actually received at least some type of aid.

Table 5. Types of aid relief received among those receiving some type of aid

Type of aid received	Percentage[a]
Water	69.96%
Food	68.28%
Medical care	59.87%
Housing aid	41.60%
Hygienic kit (Soap, toothpaste, toothbrush…)	29.41%
Professional training	5.88%
Job	4.41%
Money	3.57%
Clothing	2.52%
Other types of aid relief	2.10%

Number of observations: 476

[a] Note: Percentage do not sum up to 100 because people may have received different types of aid

Water (69.96%), food (68.28%) and medical care (59.87%) are the types of aid most people received after the earthquake among those receiving aid. About 41% received "Housing aid." In this study, Housing refers to any kind of shelter supplies people received. It does not mean "house rebuilding" because no homes were yet being rebuilt by the government or other aid agencies at the time of the survey.

Table 6. Types of food aid received among those receiving food aid

Type of food aid received	Percentage[a]
Rice	80.00%
Cooking oil	71.38%
Beans	65.54%
Spaghetti	38.15%
Other (Meat, flour and other types of food)	28.92%
Milk	28.31%
Wheat	24.92%

Number of observations: 325

[a] Note: Percentage do not sum up to 100 because people may have received different types of food aid

Table 6 reports the types of food aid received among those consumers who reported receiving some food aid. Rice, beans and cooking oil are the types of food aid most people received. Eighty percent of the people who received food aid received rice, while 71.38% of the food aid recipients received "cooking oil" and 65.54% received beans. Those three major types of food aid are followed by spaghetti (38.15%), milk (28.31%), and wheat (24.92%). Around 29% of the food aid recipients received either meat, flour or other types of food.

Table 7. Quantity of rice received (per 55 lb bag) among those receiving rice

Quantity of rice received	Percentage
½ bag	28.74%
1 bag	23.23%
More than 4	15.75%
4 bags	12.99%
3 bags	10.24%
2 bags	9.06%

Number of observations: 260

Among those who received rice, 28.74% received half of a bag and 23.23% received one bag (see table 7). The rest of the people received two bags or more.

Table 8. Quantity of beans received (per 12.25 lb bag) among those receiving beans

Quantity of beans received	Percentage
4 bags or more	23.26%
3 bags	21.40%
1 bag	20.47%
2 bags	18.60%
½ bag	16.28%

Number of observations: 165

Among those receiving beans, the amount received varied considerably across beneficiaries (see table 8). Some people received four bags or more (23.26 %). The other beans recipients received three bags (21.40%), one bag (20.47%), two bags (18.60%) and one half bag (16.28%).

Table 9. Quantity of cooking oil received (per 8 lb gallon) among those receiving oil

Quantity of cooking oil received	Percentage
1 gallon	35.78%
More than 3	23.28%
3 gallons	12.50%
2 gallons	10.78%
½ gallon	9.91%
¼ gallon	7.76%

Number of observations: 232

As shown in table 9, most of the oil recipients received one gallon (35.78%) or more than three gallons (23.28%). The rest of the people received three gallons (12.50%), two gallons (10.78%), one half a gallon (9.91%) and one quarter of a gallon (7.76%).

Table 10. Quantity of wheat received (per 55 lb bag) among those receiving wheat

Quantity of wheat received	Percentage
1 bag	57.14%
2 bags	29.87%
½ bag	10.39%
3 bags or more	2.60%

Number of observations: 77

Wheat was not a common type of food aid. As shown in table 10, those who received wheat typically received a 55 lb bag. Other people received two bags (29.87%), one half a bag (10.39%) and three bags or more (2.60%).

Very few people received cash money aid (only 3.57% reporting receiving cash aid). Those, who did, received on average only 3261.90 G ($81.55).

4.1.3. Life after the earthquake

Table 11. Preferences regarding long term food aid

Category	Percentage
Need food aid as a permanent program	67.49%
Need food aid up to 2 years after the earthquake	9.09%
Need food aid up to 1 year after the earthquake	8.82%
Don't need food aid or don't need food aid anymore	7.90%
Have no opinion	6.70%

Number of observations: 1089

When directly asked, a majority of Haitians (67.49%) indicated that they would like to be part of a permanent food aid program (see table 11). Only 7.90% of people were opposed to permanent food aid. Some people preferred instead to receive food aid either for one year (8.82%) or two years only (9.09%).

Table 12. Variation in food expenses compared to 6 months before the earthquake

Variation in food expenses	Percentage
Have no opinion	0.37%
Much more (More than 25% increase in spending)	49.59%
Somewhat more (0 to 25% increase in spending)	32.72%
About the same	6.87%
Somewhat less (0 to 25% decrease in spending)	9.81%
Much less (More than 25% decrease in spending)	0.64%

Number of observations: 1091

Table 12 reports that a majority of Haitians who participated in the survey (more than 82%) reported spending more on food six months after the earthquake than what they spent one year prior (six months before the earthquake). Only some 10% of respondents reported spending less on food after the earthquake, while 6.87% spent about the same.

Table 13. Reasons stated for increase in food expenditures among those spending more

Reasons	Percentage [a]
Inflation	84.74%
More people to feed	32.07%
Depreciation of national currency (gourde)	18.82%
Other reasons (eat out, relocation, etc.)	12.81%

Number of observations: 898

Note: [a] Percentage do not sum up to 100 because people may have been affected more than one way

When asked why they were spending more on food, inflation was the most common explanation (for 84.74% of people surveyed) followed by the increase in size of households (32.07%) (see table 13). The *monthly* inflation rate jumped to 3.5% after the earthquake in February 2010 and later dropped to -1.3% in March. However, the trend for the annual inflation rate has been steady around 6% from June to July (BRH, 2010).

Some other reasons stated for increased food expenditures related to issues such as "eat out" or "relocation."

Table 14. Reasons stated for decrease in food expenditures among those spending less

Reasons	Percentage [a]
Unable to spend more	76.32%
Other reasons	30.70%
Food aid	22.81%
Less people in household to feed	7.89%
"Budget cut" strategy	5.26%

Number of observations: 114

Note: [a] Percentage do not sum up to 100 because people may have been affected more than one way

A little over 114 subjects out of 1085 reported a decrease in expenditures on food after the earthquake (see table 14). The main reason stated for the decline in expenditures was "unable to spend more" (76.32%). The impact of food aid on decreases in food expenditures is limited. Only 22.81% of people who decreased their expenses on food stated doing so because they received food aid. This is not surprising considering that not a whole lot of people have received food aid. However, by running an interval censored regression, we found the following relationship: *Percentage change in food expenditures=20.84-7.183*Have received food aid,* where " Percentage change in food expenditures" represent several possible ranges of change in food expenditures and "Have receive food aid" is a dummy variable that takes the value of 1 when food aid is received and 0 otherwise. We have confirmed that recipients of food aid spent 7.183% less than households who did not receive food aid. Also, the results show that people without food aid spent 20.89% more on food after the earthquake.

Table 15. Quantity and quality of meals eaten per day after the earthquake

Quantity and quality of meals per day	Percentage
Rice, beans, maize, wheat, bread only available: 1 meal a day	26.38%
Rice, beans, maize, wheat, bread only available: 2 meals a day	31.53%
Rice, beans, maize, wheat, bread only available: 3 meal a day	8.55%
Rice, beans, maize, wheat, plantain, milk, fruits, meat, vegetables, bread: 1 meal a day	9.93%
Rice, beans, maize, wheat, plantain, milk, fruits, meat, vegetables, bread: 2 meal a day	13.42%
Rice, beans, maize, wheat, plantain, milk, fruits, meat, vegetables, bread: 3 meal a day	10.20%

Number of observations: 1088

Table 15 shows that most respondents have a non-diversified diet which includes some key components of traditional Haitian dishes such as rice, beans, maize, plantain and meat. They eat either two meals a day (31.53%) or one meal a day (26.38%). Some people stated having the opportunity to eat three meals a day. When it comes to a more diversified diet, 13.42% of participants had two meals a day, 10.20% had three meals and 9.93% had one meal.

Table 16. Status of housing before the earthquake

Status	Percentage
Rented house	54.75%
Own house	26.91%
Parents house	17.05%
Friends house	0.92%
Other	0.28%
Job's allocated house	0.09%

Number of observations: 1085

Rent (54.75%) was the most common type of ownership for houses before the earthquake (see table 16). House owners represented 26.91% of people interviewed. Some respondents (17.05%) were living with parents before the earthquake.

Table 17. Types of houses people were living in before and 6 months after the earthquake

Housing Type	Before	After
House covered with metallic or plastic sheet	43.24%	26.89%
House in concrete with *more* than 1 level;	31.30%	7.18%
House in concrete with 1 level;	25.46%	8.84%
Tent	0.00%	56.72%

Number of observations: 1086

As shown in table 17, houses in concrete (31.3%+25.46% = 56.76%) were the predominant type of housing before the earthquake. They had sometimes one level or more. Some others had metallic or plastic cover and represented 43.24% of the houses. Six months after the earthquake, tent was the predominant type of housing among the people surveyed. More than half of the Haitians surveyed (56.72%) were living in tents in three among the most affected regions.

Table 18. Types of housing six months after the earthquake

Type	Percentage
Tent city	35.24%
Self built tent close to damaged house	22.60%
Damaged house	19.10%
Other	9.04%
Undamaged previous house	7.29%
New rented house	6.09%
New bought house	0.46%
Job's allocated house	0.18%

Number of observations: 1084

Table 18 reports a more detailed description of people's living conditions six months after the earthquake. Some of the people living in tents were living in tent cities (35.24%) while the others built a tent nearby their damaged houses (22.60%). Twenty percent of the respondents were living in their damaged houses, and only 7.29 % were living in undamaged houses. A few people (6.09 %) were living in new rented houses

Table 19. Approximation of the percentage of medical care coverage

Range of bills covered	Percentage
Have no medical coverage	61.47%
100 % of the bills covered	21.20%
Approximately 75 % of the bills covered	13.36%
Approximately 25 % of the bills covered	3.96%

Number of observations: 1085

Table 19 shows that almost 62% of the Haitians interviewed had no medical coverage of any kind at the time of the survey. Twenty one percent had full coverage, while some 13.36 % have a partial coverage with 75% of the bills paid. However, this coverage refers in most cases to medical care provided for free for people living in tent cities. It does not necessarily imply "health insurance".

4.1.4. Time Preferences

Table 20. Time preference

Discount rate	Percentage of people surveyed
Less than 90%	9.93%
90 % or more	90.07 %

Number of observations: 1078

Results of the survey suggest that the people interviewed were highly impatient. Ninety percent of the people interviewed have a discount rate greater than 90% (see table 20). Typically, this discount rate means that respondents would agree to trade, for instance, $100 they could receive today if only they could have received in exchange more than $190 in one year.

This result contrast significantly for example, with the mean discount rate of 28.1% estimated by Harrison et al. (2002) among Danish citizens. The Haitians surveyed would rather trade almost any amount of money they can get in the future for 5000 G

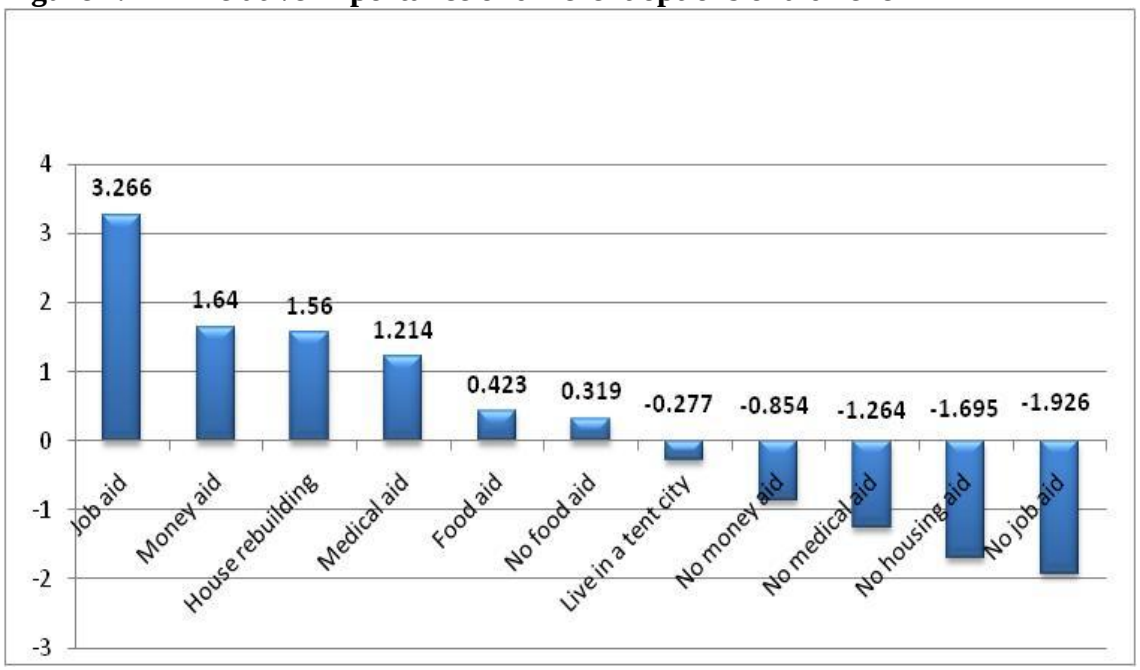
($125) they can have now. Most of the people explained that if they have money, they can put it at work and get in one year a return on investment even higher than 100% and therefore take care of their family. Another response that often came whenever they were asked about their time preference was "I don't know when I am going to die." The survey did not compare people's perception of their vulnerability before and after the earthquake, however, we discovered that most of the people felt they were vulnerable and would prefer the better life they can have "now" to the best life to come.

4.2. Econometric Analysis

4.2.1. Preferences for aid relief

This section presents the results from interviews with the 385 Haitians who completed the best-worst questions to determine preferences for different types of aid relief after the earthquake. Recall, five options of aid were considered: housing, food, medical care, job and money. For each type of aid relief (except housing), there were two levels presented: one level had to do with receiving a certain level of a particular type of aid, while the other level was "not receiving" this particular type of aid at all. For housing, there were three levels. One of these levels was "not receiving housing aid".

Figure 4. Relative importance of different options of aid relief



Number of observations: 364

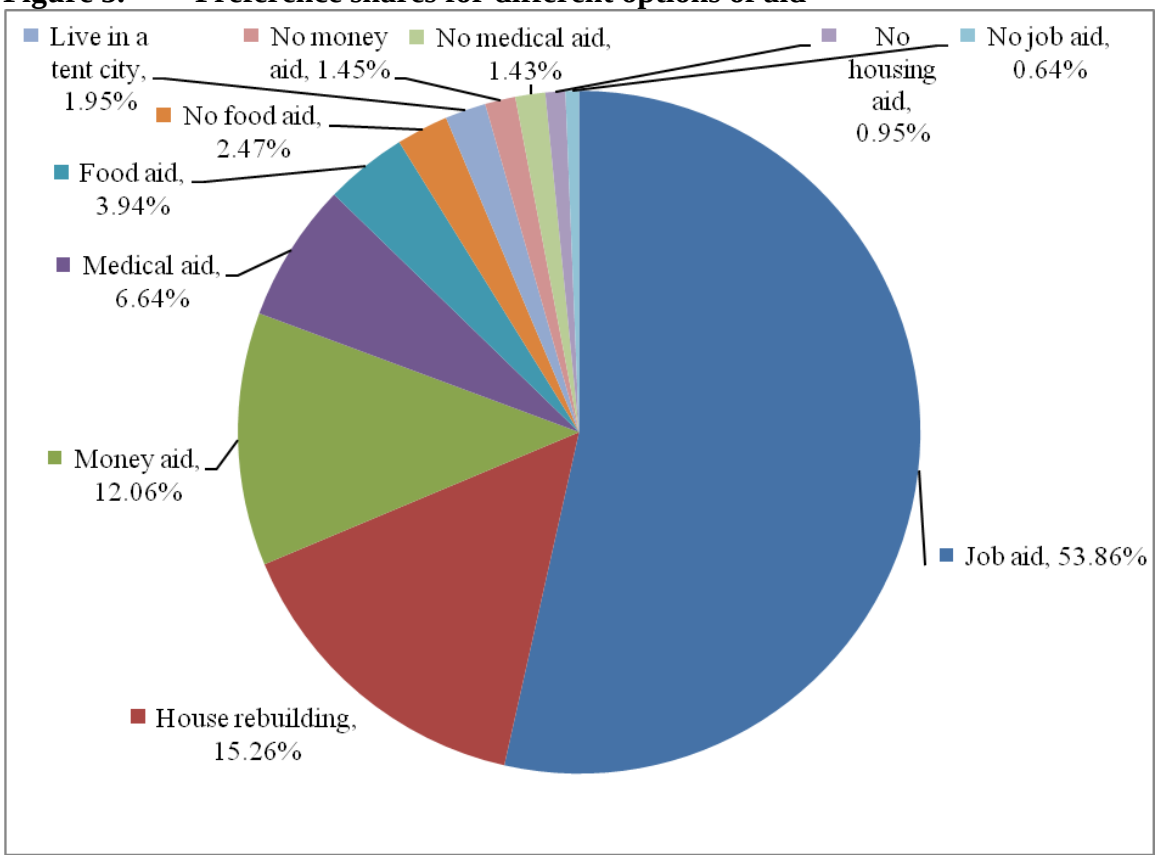
Figure 4 reports the mean results from the count-based analysis of the data, where the score for each aid type was determined by subtracting the number of times it was picked as least preferred from the number of times it was most preferred across all choice options for each participant. Results from the count-based method indicate that "Job aid" is above all the most preferred type of aid relief in Haiti, after the earthquake. On average, people chose "job aid" as the most desirable type of aid 3.266 more times than they chose it as the least desirable type of aid. Cash money ($125 monthly) comes second but with more than 1.5 point difference in the means compared to job. The Haitians surveyed chose cash money aid on average 1.64 more times as most preferred than chosen as least preferred. "Money aid" is followed by "House rebuilding," but with a very small difference in the means of those two options. "Medical aid" and "Food aid" are the fourth and fifth most desirable types of aid. Respondents picked "Live in a tent

city" as least preferred more times than they picked it as most preferred (-0.277). In addition, respondents picked "no food aid" as most preferred more times than they chose it as least preferred. "No job aid" is among all the options the least preferred (-1.926). Not having a job would make the people surveyed worst off than anything else.

In fact, we did not confirm the hypothesis that "house rebuilding" is the most preferred type of aid. Fifty five percent of the respondents rented the house where they used to live before the earthquake. The fact that they did not own the house might have decreased their interest for the "house rebuilding" option, since they had no guarantee they would benefit themselves from this aid. Another possible explanation for the rank of "house rebuilding" is the time necessary before this aid is effective. Enjoying the benefits of "job aid" or "money aid" does not require a lot of waiting and can generate in a short term quick impacts on people's life while "house rebuilding" might require much time.

Estimation of the multinomial logit model leads to essentially the same ranking as for the simpler count-based method. "Job aid" has a preference share of 53.86% (see figure 5), which means that more than 53% of the respondents consider job aid as the most important type of aid. A minor difference appears for the rank of "House rebuilding" and "Money aid". "House rebuilding" has the second highest share of preference (15.26%), while this option was ranked third from the count-based method. "Money aid" has the third highest share of preference (12.06%) from the results of the multinomial logit model. However, it ranked second from the count-based method.

Figure 5. Preference shares for different options of aid



(i) Preferences for different types of housing aid according to geographic location

From the results of the estimation (see table 21), there is not enough evidence to conclude that preference for "House rebuilding" for people in Léogâne is different from preference for people in Port-au-Prince. It is the same for Jacmel. There is not enough evidence to say that preference for "House rebuilding" in city is different from preference in Port-au-Prince.

However people interviewed in Jacmel more preferred the option "Live in a tent city" than people in Port-au-prince. In Léogâne, the people surveyed were more hostile to "Living in a tent city" than people in Port-au-Prince. The reason behind the higher preference for the choice "Live in a tent city" in Jacmel could be the difference in proportion of people living in tent cities who have received aid. Only 44% of people

surveyed in Port-au-Prince and Léogâne have received aid, while in Jacmel this figure is double. Seventy eight percent of respondents in Jacmel were still receiving food aid six months after the earthquake, while this number is only 2.3% in Port-au-Prince. Most of the people surveyed in Jacmel were living in a tent city, received food aid on a regular basis and were receiving water and medical care. They were experiencing a quality of life some of them did not necessarily have before. Therefore, they felt more comfortable to live in the tent city than people from other places.

(ii) Preferences for aid relief according to income level

We used regression analysis to determine whether the estimates for each type of aid differed across the income categories. The results indicate that Income level is not a significant factor in people's desirability for some specific types of aid relief. At 5%

Table 21. Impacts of time preference, education level, income, geographic location, age, gender, employment and type of aid received on preferences for aid relief

		"House rebuilding" aid		Live in a tent city		Food aid		Money aid		Job aid		Medical aid	
	Variables	Estimates	Pr>|t|	Estimates	Pr>|t|	Estimates	Pr>|t|	Estimates	Pr>|t|	Estimates	Pr>|t|	Estimates	Pr>|t|
	Intercept	-0.896	0.283	0.129	0.830	-0.045	0.949	1.671	0.002	4.361	<.000	1.617	0.003
Discount rate for measurement of time preference	DR<90 %	0.000	…	0.000	…	0.000	…	0.000	…	0.000	…	0.000	…
	DR ≥90 %	1.008	0.027	-0.038	0.908	0.070	0.854	0.236	0.429	-0.337	0.333	-0.724	0.014
Education level	No school	0.000	…	0.000	…	0.000	…	0.000	…	0.000	…	0.000	…
	Primary school	0.036	0.941	-0.416	0.227	0.058	0.885	-0.186	0.554	0.009	0.979	0.445	0.153
	Secondary school	-0.120	0.805	-0.475	0.173	-0.158	0.697	-0.087	0.785	0.421	0.257	0.429	0.173
	University	1.136	0.061	-1.101	0.012	-1.099	0.031	-1.215	0.002	0.134	0.772	0.327	0.405
Income level	Income ≤5000 G	0.000	…	0.000	…	0.000	…	0.000	…	0.000	…	0.000	…
	5 000 < Income ≤20, 000	0.322	0.384	0.192	0.472	-0.119	0.702	-0.528	0.030	0.057	0.839	0.155	0.519
	Income >20,000G	1.007	0.178	-0.007	0.990	0.589	0.347	-0.886	0.072	-0.740	0.196	0.560	0.249
Geographic Location	Port-au-Prince	0.000	…	0.000	…	0.000	…	0.000	…	0.000	...	0.000	...
	Léogâne	0.425	0.148	-0.626	0.003	0.073	0.767	-0.146	0.451	-0.328	0.144	0.621	0.001
	Jacmel	-1.073	0.091	2.556	<.001	-0.117	0.825	-0.742	0.075	-1.463	0.002	0.568	0.168
	Other locations	2.339	0.019	-0.701	0.327	1.159	0.165	-0.426	0.515	-2.024	0.008	-0.642	0.321
	Variables	Estimates	Pr>|t|	Estimates	Pr>|t|	Estimates	Pr>|t|	Estimates	Pr>|t|	Estimates	Pr>|t|	Estimates	Pr>|t|

Table 21. Impacts of time preference, education level, income, geographic location, age, gender, employment and type of aid received on preferences for aid relief

		"House rebuilding" aid		Live in a tent city		Food aid		Money aid		Job aid		Medical aid	
Age in years	Age	0.038	0.000	-0.004	0.767	0.017	0.074	0.010	0.239	-0.030	0.001	-0.007	0.344
Gender (1 if male; 0 if female)	Gender	-0.073	0.789	0.163	0.407	-0.400	0.083	-0.276	0.126	0.157	0.454	-0.127	0.475
Employment (1 if have a job; 0 otherwise)	Employment	-0.120	0.761	-0.241	0.398	0.090	0.794	0.149	0.566	-0.344	0.258	0.227	0.379
Food aid (1 if have received food aid; 0 otherwise)	Have received Food aid	0.245	0.457	0.141	0.550	0.180	0.514	0.014	0.9499	-0.072	0.775	-0.335	0.117
Housing aid (1 if have received housing aid; 0 otherwise)	Have received Housing aid	0.263	0.462	0.885	0.001	0.754	0.012	-0.028	0.904	0.170	0.534	-0.110	0.635
Medical aid (1 if have received medical aid; 0 otherwise)	Have received Medical aid	-0.590	0.078	-0.242	0.315	-0.178	0.525	-0.104	0.635	0.500	0.051	0.118	0.588
		N	375	N	375	N	375	N	375	N	375	N	375
		R^2	0.1271	R^2	0.2158	R^2	0.0908	R^2	0.1178	R^2	0.1391	R^2	0.0772
		Pr>F	<.0001	Pr>F	<.0001	Pr>F	0.0026	Pr>F	<.0001	Pr>F	<.0001	Pr>F	0.0144

significance level, we do not have enough evidence to conclude that preference for "house rebuilding", "live in a camp", "food aid", "job aid" and "medical aid" is different for people who earn monthly between 5,000 G to 20,000 G and those who earn less 5,000 G, and for people who earn more than 20,000 G and those who earn less than 5,000 G. Except for "money aid," people with a higher income are less interested in receiving this type of aid than people with lower income.

(iii)Preferences for aid according to education level

There is not sufficient evidence to say that preference for food aid is different for people who have attended only primary school and those who have not been to school at all or for people who have been to secondary school and the people who have not been to school at all (see table 21). However people who have attended at least one-year University have statistically a lower preference for food aid than people who had never been to school. Those respondents with university level education also have less interest to live in a tent city or to receive cash money aid than the people who have not attended school at all. The results of the estimation, once again, do not give enough evidence to say that preference for "live in a tent city" is different for "primary school" level and "no school at all" level or for "secondary education" level and "no school at all" level. Also, those results do not allow us to conclude that preference for "medical aid" is different for the people who have not been to school at all, compared to the other education level groups.

(iv) Impacts of time preference on people's preferences for aid

There is not sufficient evidence that time preference was a major factor in people's choice relative to several aid options. We could not conclude whether a high or low discount rate had any impact on preferences for the options "live in a tent city", "food aid", "money aid" or "job aid". However, the results suggest that people who are less patient (high discount rate) have a lower preference for medical aid as compared to people who are more patient (low discount rate). Also, surprisingly, people who are less patient show higher interest to benefit from "house rebuilding" aid.

There is not enough evidence that gender or age have significant impact on people's desirability level for aid. However, we found that older people were more interested in "House rebuilding" aid and less interested in "Job aid" than younger people.

4.2.2. Choices regarding quality of life

Another 708 participants were asked a series of choice questions regarding which type of life they most preferred, where the hypothetical lives were defined by a set of attributes including income level, housing, etc. Table 22 reports the results of the multinomial logit model fit to these choices to determine people's utilities for these quality of life attributes.

Table 22. Multinomial logit estimation with income considered as continuous variable

Variables	Estimates	Standard Error	Chi- Square Pr > ChiSq
Housing			
Base: Tent	0.000	0.000	0.000
House in concrete/1 level	1.729	0.115	<.0001
House in concrete/more than 1 level	0.871	0.075	<.0001
House with metal or plastic cover	1.007	0.087	<.0001
Food			
Base: 1 meal a day/non-diversified diet	0.000	0.000	…
3 meals a day/non diversified diet	0.264	0.080	0.001
1 meal a day/diversified diet	0.711	0.096	<.0001
3 meals a day/diversified diet	0 .151	0.074	0.042
Medical care			
Base: Self funded Medical care	0.000	0.000	…
25 % of medical care bills paid	0.122	0.071	0.085
75 % of medical care bills paid	0.374	0.095	<.0001
Free medical care	0.200	0.121	0.098
Money	0.006	0.001	<.0001
Education			
Base: No school at all	0.000	0.000	0.000
Primary school	1.447	0.085	<.0001
Secondary school	2.969	0.102	<.0001
University	5.275	0.134	<.0001
Number of observations	708		
Number of choices	12554		
Log likelihood	-2137		

The model was estimated with income considered as a continuous variable. All the other four attributes were considered at four levels. We set a base level for each attribute and the other levels were estimated in relation to this base. A positive coefficient

for an estimate indicates that this level is considered as more desirable for the respondents compared to the base; while a negative coefficient show that the level is less desirable.

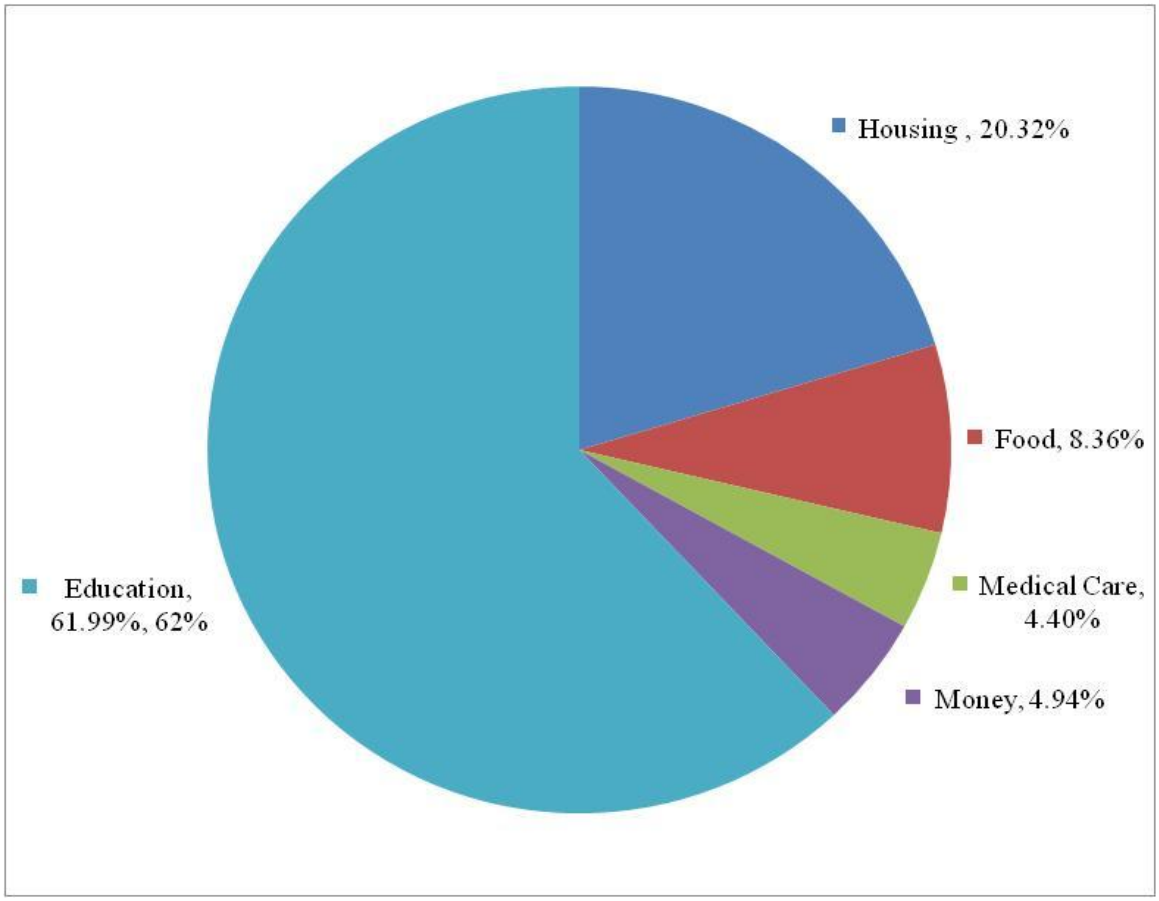
The results suggest that the Haitians surveyed would rather live in houses in concrete instead of living in a tent. Results of the estimation lead to a coefficient of 1.729 for houses in concrete with one level and a coefficient of 0.871 for houses in concrete with more than one level. Preferences for houses in concrete compared to tents decrease as the number of levels in the house increases. Logically, people also consider living in a house with plastic or metal cover a better choice than living in a tent (λ_{kj} =1.007).

The results indicate that, in terms of food, respondents preferred to have "one meal a day with a diversified diet" (λ_{kj} =0.711) to "one meal a day with a non-diversified" diet. Surprisingly, the "3 meals a day/non diversified diet" option ranks second in terms of meals preference (λ_{kj} =0.264), followed by the option "3 meals a day/diversified diet" (λ_{kj} =0.151).

In terms of health care, the people surveyed most preferred "75 % of medical care bills paid" (λ_{kj} =0.374), which was surprisingly more preferred to "free medical care." When it comes to education, the level considered as the highest in the questionnaire – University degree – is ranked the highest by the people surveyed. University degree has an estimate of 0.542.

Results of the multinomial logit estimation show that Haitians value education more than the other attributes considered. "

Figure 6. Relative importance of quality of life attributes



In our study, levels for each attribute are estimated compared to a base. Then, attribute utility will be the highest level minus zero. For instance, it will be "5.275- 0" for education. As a result, attribute utility range is AUR_1=1.729 for housing, AUR_2=0.711 for food, AUR_3=0.374 for medical care, AUR_4=0.420 for income (0.006*75-0.006*5) and AUR_5 =5.275 for education.

By adding all those attributes utilities, the utility range total (URT) becomes 8.509. Ratios of the attribute utilities to utility range total give the relative importance scores for each attribute as presented in figure 6.

Following the latter formula, attribute utility range for housing is:

AI_1 = 1.729/ (1.729+0.711+0.374+0.420+5.275) = 1.727/8.509 = 20.32%.

Figure 6 shows that education is considered as the most important attribute in the Haitians' life (AI_5=61.99%), followed by housing (AI_1=20.32%). Education is valued three times more important than Housing. Food (AI_2), medical care (AI_3) and income (AI_4) have each a close importance score, falling between the range 4% to 9%.

4.2.3. Willingness to pay

Results indicate that respondents were WTP 167,830 G monthly ($4195.75) for house with metal or plastic cover relative to tent. WTP to have a house in concrete with one level relative to tent is 288,167 G ($7204.17) monthly.

In terms of food, the people surveyed were WTP 44,000 G ($1100) to have "three meals a day with a non diversified diet" versus "1 meal a day/non diversified diet". Surprisingly, they are willing to pay less (25,167 G or $629.167 monthly) to have "three meals a day and a diversified diet" versus "1 meal a day/non diversified diet".

Regarding health care, participants in the study were WTP 62,333 G ($1,558.33) monthly to have a 75 % medical coverage versus no medical coverage.

In terms of education, the people interviewed show a WTP of 494,833 G ($12,370.8) to ensure access to Secondary school for their children relative to "no school at all". When it comes to University versus "no school at all", they were WTP 879,167 G ($21,979.2) monthly. They also show a high WTP to guarantee access to University to their kids versus secondary school (384,330 G or $9608.33).

The WTP for a University degree relative to a 75 % medical coverage is 816,833 G ($20,420.8). Compared to house in concrete with 1 level, the WTP for a University

degree is 591,000 G ($14,775). Respondents also show a high willingness to give up a "3 meals a day/diversified diet" option to guarantee access to University to their children (854,000 G or $21350).

Those WTPs seem to be excessively large compared to what the majority of the people surveyed can really afford to pay in the real life. It is unrealistic that people who earn less than 5,000 G monthly are WTP 44,000 G monthly to have 3 meals a day with a non-diversified diet. Those results imply that because income level is so low the real value of a certain high income level does not have a real meaning for the respondents. Therefore, the marginal utility of income does not have a real significance.

4.2.4. Change in people's life

From the estimation, utility for someone living in a house with metal or plastic cover is given by: $V_i^{Before} = 1.007 + 0.006(Income)$

If this person moves to a tent, then his utility becomes:

$V_i^{After} = 0 + 0.006(Income)$

The change in utility is given by: $V_i^{After} - V_i^{Before} = -1.007$. In monetary value, this change becomes -1.007/0.006= -167.833 thousands G (-167,833 G) or $ -4.196 thousands (-$4,196), being put in relation to the income coefficient.

Having calculated change in utility resulted from change in housing situation for each respondent, we then sum up the individual changes to come up with change for all the people surveyed. The total change in utility caused by change in housing situation is given by: $\sum(V_i^{After} - V_i^{Before})$. The resulted average change is: $\sum(V_i^{After} - V_i^{Before})/N = \sum(V_i^{After} - V_i^{Before})/708$.

The results show that Haitians' utility decreases on average by 100,937 G ($2,523) monthly because of change in housing situation after the earthquake. Considered for the whole sample, utility decreases by 71.46 million G ($1.78 million) monthly.

We repeated the same process for education to calculate expected change in utility as a consequence of change in access to education. We studied what could have been the impacts of a better access to education on the Haitians' life. We considered on one hand the education level of the respondents and on the other hand the education level they wish for their children, following the same procedure used for housing. Considering the education level of the respondents, if their children could have had the education level those parents want for them, utility of the Haitians would have increased monthly by 371,294 G ($9,282) on average. The results indicate that better education is one area that can bring significant improvement into the Haitians quality of life.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

The earthquake that struck Haiti in 2010 has been the most powerful in the country's history for 200 years (PDNA, 2010). Despite the outpouring of international aid, little is known about the effectiveness of the generosity or how future efforts might be improved. This research explored what types of aid those Haitians most desired.

Although our survey focused on those people most affected by the earthquake, surprisingly, only 44% reported receiving any aid. Among factors such as employment, house rebuilding, medical care, food and cash money, the people surveyed stated being most in need of a job. "Cash money" aid and "House rebuilding" aid rank pretty much the same as second and third most preferred types of aid relief. The ranking for job and cash money aid reveals people's interest to have a kind of independence from constant assistance. Moreover, the option "not receive job aid" is the least preferred among the 11 options. This result suggests that "not find a job" would make people worse off than anything else. Results indicate that 82% of those surveyed did not have a job at the time of the survey. Seventy four percent of the Haitians interviewed stated that they earn

monthly less than 5000 G ($125)[4]. Clearly, the low incomes are a result of the low employment rate.

We found out that while the majority of the people surveyed are interested to be part of a permanent food aid program (67 %), people who have attended a university at least for one-year are less interested in receiving food aid, compared to people who have not attended school at all. Also, people who have higher income are less interested in receiving money aid.

This research reports that "Education" is the most important attribute in the Haitians' life. Education (attribute importance = 61.99) is valued three times more important than housing (attribute importance = 20.32), the second most important attribute in terms of quality of life.

In this research, we also explored the usefulness of a survey-based approach to measure the economic consequences of natural disasters that result from changes in citizens living conditions. We focused on change in housing situation and expected change in education to demonstrate how much Haitians' welfare decreased or would increase. Haitians' utility decreased monthly by 100,937 G ($2,523) because of change in housing situation after the earthquake and utility would have increased monthly by 371,294 G ($9,282) on average with the children having the ideal education.

This research represents an attempt to measure how people value different types of aid relief after the earthquake in Haiti. Additional work is needed. For instance, people were interviewed without any incentives. Their choice did not have any consequences on

[4]The minimum wage is 40 gourdes ($5) par day. For 25 days of work in a month, the monthly minimum wage is equivalent to 5000 gourdes ($125)

their real life and therefore they did not have much inclination to tell the truth. It would have been interesting to see how respondents would react knowing that they would actually receive the type of aid chosen or would have the attributes for the quality of life chosen.

Moreover, the survey was conducted 6 months after the earthquake. Needs could have been different if the survey was conducted one month or two years following the quake. It is uncertain whether the preferences expressed at the time of the survey will remain the same several months later. It might be beneficial to track a panel of people in order to study stability of Haitians' preferences for aid relief over time.

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APPENDICES

Appendix 1. Expectations and donations of aid

Variable	Percentage
People who were expecting aid	97.6%
People who have received aid	43.59%

Number of observations: 1092

Appendix 2. Relative importance of other types of aid relief compared to food aid

Aid options	MNL Econometric Estimates	Standard Error	Preference share
Job aid	2.616	0.158	53.86%
House rebuilding	1.355	0.199	15.26%
Money aid	1.119	0.169	12.06%
Medical aid	0.522	0.171	6.64%
Food aid	0.000	…	3.95%
No food aid	-0.465	0.162	2.48%
Live in a camp	-0.702	0.211	1.95%
No money aid	-0.998	0.202	1.46%
No medical aid	-1.016	0.202	1.43%
No housing aid	-1.424	0.190	0.95%
No job aid	-1.810	0.145	0.65%
Number of individuals	364		
Number of choices	45390		
Log Likelihood	-2011		

Appendix 3. Level for each attribute considered for aid relief

Housing

- House rebuilding: The government or an agency rebuild your house in a place you currently own
- Live in a tent city: You live in a tent city constructed by the government or other agencies
- No housing aid: You will not receive any type of housing aid

Food

- Food aid: You receive a monthly allocation of 2 bags of rice (25 kg), 2 gallons of oil (3.78 liters), 2 bags of bean (5.56 kg); 2 packs of milk (5.56 kg)
- No food aid: You will not receive any type of food aid

Medical care

- Medical aid: You can go to the doctor once a month and have the bills paid by the government or other agencies
- No medical aid: You will not receive any type of medical aid

Job

- Job aid: You find a job that meets your salary expectations
- No job aid: You will not receive any type of job aid

Money

- Money aid: You receive a monthly aid in cash of 5,000 G
- No money aid: You will not receive any money aid

Appendix4. Impact of food aid on food expenditures

The LIFEREG Procedure

Model Information

Data Set	WORK.VERSION1TS
Dependent Variable	lower
Dependent Variable	upper
Number of Observations	363
Noncensored Values	25
Right Censored Values	133
Left Censored Values	1
Interval Censored Values	204
Name of Distribution	Normal
Log Likelihood	-428.5527019

Number of Observations Read	364
Number of Observations Used	363
Missing Values	1

Fit Statistics

-2 Log Likelihood	857.105
AIC (smaller is better)	863.105
AICC (smaller is better)	863.172
BIC (smaller is better)	874.789

Algorithm converged.

Type III Analysis of Effects

Effect	DF	Wald Chi-Square	Pr > ChiSq
foodaid	1	11.5102	0.0007

Analysis of Maximum Likelihood Parameter Estimates

Parameter	DF	Estimate	Standard Error	95% Confidence Limits		Chi-Square	Pr > ChiSq
Intercept	1	20.8409	1.1491	18.5887	23.0930	328.95	<.0001
foodaid	1	-7.1838	2.1174	-11.3339	-3.0337	11.51	0.0007
Scale	1	16.1411	0.8912	14.4856	17.9857		

VITA

Rock André

Candidate for the Degree of

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Scope and Method of Study: This research has two primary objectives: a) determine Haitian's preferences for food and other basic needs in the aftermath of the Haiti's earthquake; b) determine the quality of life Haitians desire. We analyze how people value food donations compared to some other basic needs such as housing, medical care, employment, and money. Other specific objectives include determining: i) the type and quantity of food aid received, ii) the impact of food aid on households' food expenditures, iii) the impact of education and income level on preferences for food aid, iv) the impact of geographic location on preferences for aid relief, v) the relationship between time preferences and preferences for different types of aid relief. A final objective was to explore the usefulness of a survey-based approach to measure the economic consequences of natural disasters that result from changes in citizens' living conditions.

Findings and Conclusions: Although our survey focused on those people most affected by the earthquake, surprisingly, only 44% reported receiving any aid. Among factors such as employment, house rebuilding, medical care, food aid and cash money aid, the people surveyed stated being most in need of a job. Results indicate that 82% of those surveyed did not have a job at the time of the survey. Seventy four percent of the Haitians interviewed stated that they earn monthly less than 5000 G ($125). We found out that while the majority of the people surveyed are interested to be part of a permanent food aid program (67 %), people who have attended a university at least for one-year are less interested in receiving food aid. Also, people who have higher income are less interested in receiving money aid. This research reports that "Education" is the most important attribute in the Haitians' life. Education is valued as three times more important compared to housing the second most important attribute in terms of quality of life. The Haitians' utility decreased monthly by 100,937 G ($2,523) because of change in housing situation after the earthquake and their utility would have increased monthly by 371,294 G ($9,282) on average if they could provide their kids the ideal education.

ADVISER'S APPROVAL: Jayson L. Lusk